

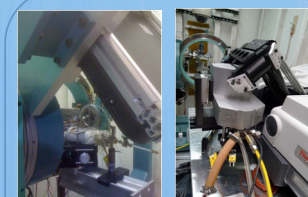
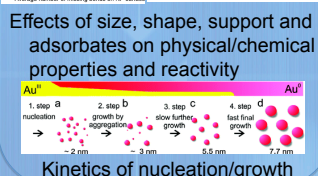
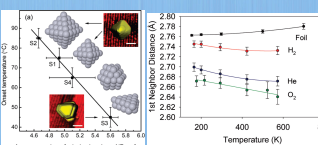
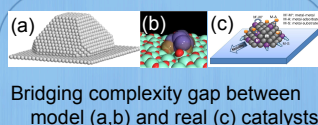
# QUICK ABSORPTION SPECTROSCOPY (QAS)

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## TECHNIQUES AND CAPABILITIES

- Will enable in-situ and operando studies of complex nanoscale systems undergoing real-time transformations
- Will enable synchronous measurements of nanocatalysts by complementary techniques including IR, XAS, XRD, DAFS and Mass Spectrometry with high energy resolution
- Will probe complex interactions in nanoscale systems at the time scale from tens of ms to hours and length scale from Å to μm

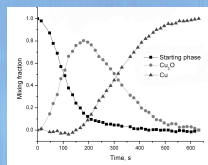


XAFS/XRD/DAFS/MS DRIFTS/XAFS/MS



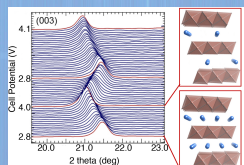
QEXAFS

## APPLICATIONS



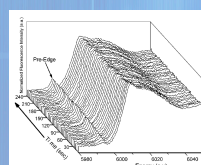
Investigation of  $\text{Cu}^{2+}/\text{CeO}_2 \rightarrow \text{Cu}^0$  reaction kinetics by QEXAFS.

**CATALYSIS:**  
Investigations of structure, kinetics, dynamics and reactivity during in situ transformations with 10 ms time resolution



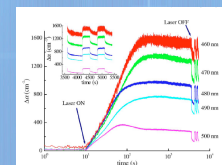
$\text{LiCoO}_2$  during a charge-discharge-charge cycle:

**ENERGY GENERATION AND STORAGE:**  
Understanding the physical and chemical processes in batteries and fuel cells



$\text{Cr(III)}$  oxidation kinetics ( $[\text{Cr(III)}] = 100 \text{ mM}$ )

**ENVIRONMENTAL SCIENCE:**  
Kinetics of rapid chemical processes on mineral surfaces and soils

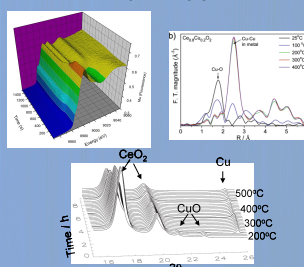


Photoinduced changes in amorphous chalcogenide films

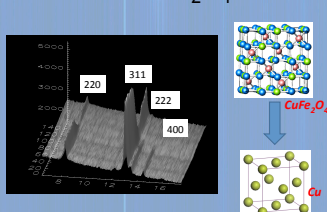
**GLASSES AND MEMORY ALLOYS:**  
Understanding correlations between glass-forming ability and structure of novel glasses and phase-change materials

## SPECIFIC PROJECTS / ADDITIONAL INFORMATION

**Water-Gas Shift catalyst:**  
 $\text{Cu}_{0.2}\text{Ce}_{0.8}\text{O}_2$



**Water-Gas Shift catalyst:**  
 $\text{CuFe}_2\text{O}_4$



**TECHNIQUES:** X-ray absorption spectroscopy and x-ray diffraction with 10ms time resolution, combined with multiple complementary techniques: IR, MS, DAFS, HERFD

**MONOCHROMATORS:** Double Crystal (slow scanning) and Channel Cut (Quick EXAFS)

**SOURCE:** Three pole wiggler